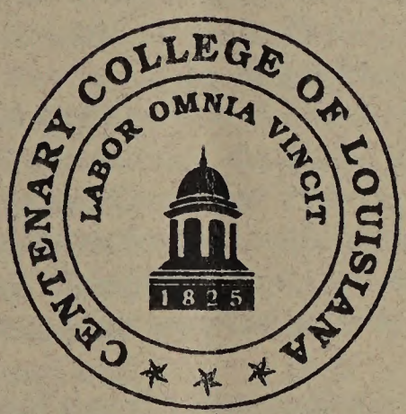
Centenary College
of
Louisiana



10th Annual
Student Research Forum

Friday, April 20, 2001
Carlile Auditiorium - MKL 114

CENTENARY COLLEGE
STUDENT RESEARCH FORUM

Sponsored by The Muses and Provost & Dean of the College

1:45	Opening
Social Sciences Division	
1:45	Angela Cage, Dance
2:00	Laura Walker, Sociology
Humanities Division	
2:15	Emily Pinnix, Music
2:30	Amy Coughenour, English
2:45	Stacy Shelton, Art
Natural Sciences Division	
3:00	Valerie Curtis, Chemistry
3:15	Cody McDonald, Chemistry
3:30	Owen Mogabgab, Chemistry
3:45	Alison Culver, Geology
Break – 4:00 – 4:15 p.m.	
4:15	Jasmin Alibalic, Math
4:30	Brandy Gunderson, Math
4:45	Courtney Patterson, Math
5:00	Katie Furr, Biology
5:15	Jeanne Rasbery, Biology
5:30	Meghan Andrews, Physics
5:45	Julie Reisig, Physics
6:00	Colin Delaney, Physics
6:15	Jasmin Alibalic, Physics

Judges
Dr. Jodi Campbell
Dr. Susan Brayford
Dr. Ron Martin

I would like to thank our judges for volunteering their time to judge this wonderful event. I also would like to thank Ms. Jeannie Clements for volunteering her time to prepare the programs and the participation and award certificates. And a BIG THANKS to the Centenary Muses, without their financial support we will never be able to have this forum. See you all there! Come and support your friends and students!

Yvonne Ilke Yaz
Director

RESEARCH PAPERS

Motivations and Attitudes in a Community Renewal Program

LAURA WALKER
Department Of Sociology, Social Sciences Division

Shreveport-Bossier Community Renewal (SBCR) is a non-profit organization dedicated to rebuilding the community by building relationships between people in the community. The Haven House Plan, one aspect of the organization's efforts, teaches a block-by-block approach to help people build relationships with neighbors on their block. My research focuses on the people involved with the Haven House Plan, their motivation for participation, and the ways in which they manipulate the plan to make it work in their neighborhood. Because SBCR is a faith-based organization, I was interested further in how religion plays a role in people's participation with, and approach to the Haven House Plan. Data were collected during nineteen in-depth interviews with people who are or were involved with the plan. A qualitative analysis then identified some overarching patterns among participants. Initial findings indicate that faith is a motivator for participation but is not used to reach people on the blocks. Further, there is an interesting difference by class in the ways the plan was used. Specifically, participants in lower income areas used the plan to accomplish certain political goals for their neighborhood, while participants in middle class areas used the plan to increase socializing opportunities with their neighbors.

The Effects of Music on the Human Brain: Learning and Emotion

EMILY C. PINNIX
Hurley School of Music, Humanities Division

For thousands of years, people have believed that music has positive effects on emotion. Even in Biblical times and in ancient Greece, music was used to cheer and inspire the spirit. Now, the increase in the popularity of music therapy shows that people still agree that music has significant benefits. The positive results of music therapy have been tremendous in studies conducted on clinically depressed patients. For them, music can serve as a means of expression, or it can be an uplifting part of a therapeutic program. It is also believed that music has an impact on the ability to learn, especially in young children. There have been numerous studies that support this idea. Many new programs in schools and daycare facilities have been developed on this theory. These findings prove that music therapy is a necessary and important innovation in the fields of both music education and psychology.

Hypertext in Fairy Tales

AMY COUGHENOUR*
English Department, Humanities Division

This thesis centers on the element of hypertext in fairy tales. In the first part, I wrote my own fairy tales, and in the second part, I analyzed fairy tales.

In the first part of my thesis, I wrote three fairy tales using a different hypertext strategy for each. "Cat Dreams and Ocelot Schemes" uses hypertext to present a linear story. "Clouds of Impish Dreams" uses hypertext to present a primarily linear tale with multilinear offshoots. "Caerin and Fey" uses hypertext to present a main story with a linear structure holding inner stories with the ability to be read in any order.

In the second part of my thesis, "Rhizomatic Mediation Between Spaces in Fairy Tales," I analyzed the types of spaces present in fairy tales and the mediation between those spaces, which I argued were rhizomatic, using Deleuze and Guattari's theory, in their movement and connectivity.

Because of the hypertextual nature of my thesis and to make it more accessible, the entire project exists online and can be found at the following URL:
http://personal.centenary.edu/~acoughen/spring01/honors.

Barbara Hepworth: Out of Obscurity

STACY SHELTON
Art Department, Humanities Division

Although we often speak of equality between men and women as an already accomplished feat, at the beginning of the twenty-first century, recognition still seems to evade most female artists. One such artist is Barbara Hepworth, a twentieth-century English sculptor who has never gained as much attention as one of her contemporaries—Henry Moore, subject of the recent Dallas Museum of Art retrospective. Both artists attended art school together, used the same studio, and worked with similar materials and themes. First they began creating animal sculptures, then Hepworth progressed to primarily organic, fluid forms and Moore to human figures. Even though their work is sometimes almost visually identical, Moore has received almost all the critical acclaim, while Hepworth has been virtually ignored. Attesting to this fact, whereas the British Library possesses one hundred twenty-seven documents for Moore, it only has a mere twenty-five documents for Hepworth. This pattern persists in Centenary's own library as well, which owns only two books on Hepworth and over ten on Moore. After discovering the history of Hepworth and Moore's parallel development as artists, it becomes obvious that Hepworth's work has been unfairly overlooked and should be revisited.

Laser-induced incandescence measurements in turbulent ethylene diffusion flames

Valerie E. Curtis* - Chemistry Undergraduate, Centenary College
Thomas M. Ticich - Department of Chemistry, Centenary College
Randall L. Vander Wal - NCMR, NASA-Glenn Research Center
Michael W. Millard - NCMR, NASA-Glenn Research Center

This work explores the effect of turbulence on soot formation and inception. We used Laser-Induced Incandescence (LII) and a cooled ICCD camera to obtain spatially resolved images of the soot produced in ethylene diffusion flames with Reynolds numbers of 2000, 4000, and 8000. For the 4000 Reynolds number case, the co-flow was varied from15% to 27% oxygen to provide vitiation, normal, and oxygen-rich environments. Radial profiles of the LII images taken at various heights above the burner show that soot volume fraction increases significantly with oxygen concentration while the radial extent of the soot becomes narrower. The magnitude and frequency of the oscillations observed in soot volume fraction also increase with oxygen concentration. These trends can be understood by shifts in the flame front (as defined by the stoichiometric mixture of fuel and oxidizer) relative to the shear layer.

Fluorescence Analysis of Acetylene Dicarboxamide

CODY MCDONALD
Department of Chemistry, HHMI

Triple bonds are scarce in compounds produced by living organisms. One such compound that contains a triple bond is Acetylene Dicarboxamide, commonly called Cellocidin. Our goal was to isolate the enzyme that facilitates the addition of the triple bond to Cellocidin. Fluoremetry was one way we detected the presence of Cellocidin in low concentrations throughout the process of isolating the enzyme.

Delayed Ethanol Preconditioning Prevents Injury in Postischemic Mouse Jejunum

Owen Mogabgab*, Kate Dayton, Doug Smith, Gina Hampton,
Patsy Carter, Ronald J. Korthuis
Physiology Department, LSUHSC

We have previously shown that exposing mesenteric venules to 0.1 vol% ethanol for 10 min 24 hours (delayed ethanol preconditioning (ETOH-PC)) prior to prolonged ischemia (20 min) and reperfusion (60 min) (I/R) prevents postischemic leukocyte rolling, adhesion, and emigration. Since I/R-induced leukocyte rolling is dependent upon the expression of P-selectin, we hypothesized that the beneficial anti-inflammatory effects of delayed ETOH-PC were due to suppression of postischemic P-selectin expression. To address this postulate, we used a dual radiolabeled monoclonal antibody technique to quantify P-selectin expression in

murine small intestine after exposure to I/R 24 hours after the bolus administration of ethanol (in bicarbonate buffered saline (BBS) vehicle) by gavage (0.001 ml ethanol/0.6g body weight in 0.3 ml BBS) or vehicle alone. The results obtained in these animals were compared to those obtained in mice that were treated in the same way on Day 1 but were not exposed to I/R on Day 2. In addition, the potential roles of adenosine and nitric oxide (NO) as triggers of delayed ETOH-PC were investigated by use of adenosine deaminase (ADA, metabolizes adenosine to inosine) and L-NIO (an NO synthase inhibitor), respectively. I/R induced a marked increase in intestinal P-selectin expression when compared to non-ischemic control animals. Ethanol administration on Day 1 was associated with a rapid rise in plasma ethanol concentration that peaked at 40 mg/dl 30 min after bolus injection and returned to control levels within 60 min of administration. This treatment completely prevented the upregulation of P-selectin noted after I/R on Day 2. In continuing trials PKC inhibitors showed similar results. It appears that adenosine, NO, and one or two PKC's, produced during the period of ethanol exposure may serve as an initiator of the powerful anti-inflammatory effects of delayed ETOH-PC.

Landscape Modification of the Smackover Field, Arkansas

ALISON D CULVER*, MARY L. BARRETT
Deptartment of Geology and Geography

The Smackover Oil Field in south central Arkansas remains the largest oil field in Arkansas. In the early to middle 1920s it was one of the biggest oil fields in the United States. With such success came oil field waste and land destruction. This study characterizes the landscape modification and healing that has occurred in the Smackover Field since the years of peak production. Aerial photography from 1936 and 1996 was used to study landscape change. The major features mapped were earthen storage pits and associated landscape scars. The pits held millions of barrels of oil and unwanted saltwater, which commonly leaked into drainage areas.

GIS software was used to evaluate pit distribution through time. Digital mapping allowed for quick comparison of surface topography and drainage plus production distribution. Two types of pit were defined, intact pits and scars. Intact pits were areas that still held the basic shape of the original pit. Scars were defined as areas that were leveled out, but retained the basic shape of the original pit due to a lack of vegetation present there. A variety of comparisons can be made from two sets of photographs. The areas of the pits and scars in 1936 and 1996 were compared to determine the percent of reduction of the pits and vegetative healing that has occurred over 60 years. The distribution of scars has a direct relationship to the density of wells in the field. Areas where the well sites are denser produce more scars and pits.

Continuous eigenpaths as a method of finding infinitely many solutions of the nonlinear laplacian.

JASMIN "JAZZ" ALIBALIC * - Centenary College of LA
Jeremy Van-Horn Morris - University of Oregon
Dr. J Neuberger - Northern Arizona University
Dr. Y. Yaz - Centenary College of LA
Department of mathematics – Northern Arizona University

We considered the eighty-year old problem of the nonlinear Laplacian,

$$\Delta u + f(u) = 0$$

for $u : \Omega \to \mathbf{R}$, where Ω is a smooth, bounded subset of $\mathbf{R}^N$, with $u = 0$ on $\partial\Omega$, and $f : \mathbf{R} \to \mathbf{R}$, and f is C^2, subcritical, and superlinear. First of all, a functional is almost the same as a function, except for its domain it has functions. The action functional J : X -> R is defined by

$J(u) = \int_{\Omega} \{\frac{1}{2}|\nabla u|^2 - F(u)\}dx$, where $F(u) = \int_0^u f(s)ds$ is the primitive of f.

It can be easily shown that the grad J(u) = 0 if and only if u is a weak solution to our original problem. From that it can be said that the critical points of J are the solutions to the nonlinear Laplacian and vice versa. So far, it was shown that if f(0) = 0 and f '(0) < λ_1, then there exists a positive, a negative and a sign changing solution exactly once solution to the superlinear, subcritical problem. It has been widely conjectured that there are infinitely many solutions and the main goal was to try to numerically show this. In this study, we tried to find an algorithm that would confirm the existence of infinitely many solutions.

Modeling and Control of the Rolling Motion of a Cruise Ship

BRANDY GUNDERSON
Department of Mathematics, Natural Sciences Division

It is important to ensure passenger comfort on cruise ships by stabilizing the ship's oscillations due to waves. Most ship stabilization systems use fins or hydrofoils projecting into the water to generate a stabilization torque on the ship.

In this study, the rolling motion of a cruise ship is modeled as an oscillating pendulum. Simulation studies are conducted to see how the ship responds to the effect of the waves. In order to improve the unsatisfactory response, a closed loop feedback control is designed. The effect of the magnitude of the control gain on the overall response of the system is investigated. A design value is found that presents a compromise between steady state accuracy, response time and response speed.

Tightly-Attached, Semi-Transitive Orientations for Undirected Graphs

COURTNEY PATTERSON
Department of Mathematics, Northern Arizona University

Given a graph A, is A semi-transitive? If so, how many semi-transitive orientations does it have? These are the two questions that sparked my research. Semi-transitive orientations are very hard to identify. Each edge of a graph can have two unique orientations, so a graph with n edges has 2^n orientations. This number is large. It is not efficient to consider every individual orientation and check whether or not it is semi-transitive. So, the search was narrowed. My research advisor proved the following result: If an orientation Δ is tightly-attached then Δ is a semi-transitive orientation. Hence, I have devised four algorithms for finding tightly-attached orientations. They involve inspecting the automorphism group of the graph, inspecting the block system, and using either the level preserving or the level permuting permutations of the automorphism according to as special addressing scheme. These algorithms identify orientations that are semi-transitive, and so they can be used to answer the initial question affirmatively.

Heterocysts in nitrogen-fixing cyanobacteria in Louisiana estuaries

KATIE FURR*, Quay Dortch, R.E. Turner
Biology, Natural Sciences Division

Large blooms of colonial cyanobacteria, consisting primarily of *Anabena spp.*, occur in some low salinity Louisiana estuaries. Most *Anabena* are capable of N-fixation, which is performed in specialized cells called heterocysts. N-fixation could be a major factor in prolonging these Harmful Algal Blooms (HAB). There is some debate whether the presence of heterocysts means that N-fixation is actively occurring. Since N-fixation only occurs when dissolved inorganic nitrogen concentrations are low, we hypothesized that if heterocysts are present only when DIN is low, then heterocyst presence can be taken as an indirect indicator that N0-fixation is occurring. Three areas were studied to determine the relationship between nitrogen levels and heterocyst formation in *Anabena spp.*: Lac des Allemands, Lake Salvador, and Lake Pontchartrain, the latter having had an exceptionally large bloom in early 1997. It was determined that when the nitrogen levels in the water were high, there were no heterocysts. When DIN < 10 μM and N/P ratios <30, the number of heterocysts increased. Heterocysts could make up to 10% of the total *Anabena* cells under conditions of low N availability. Thus, heterocysts may be an indicator that *Anabena spp.* are fixing nitrogen.

Centenary College Virtual Arboretum

JEANNE RASBERY
Biology Department, Natural Sciences Division

For my Biology honors project, I have built a virtual arboretum, complete with a virtual tour of the arboretum, in which actual photographs of the arboretum are available for viewing. On the main page, I have provided an information page describing what the site contains. This page links to other pages containing the plants and birds of the arboretum, a page to submit questions and/or comments, links to other plant sites, and a page with contact information on the people who have worked on this project. The main page also contains links to the Biology Department at Centenary as well as the College itself, as well as a brief history of how the arboretum was built and why it is at Centenary. Once viewers begin the tour of the arboretum, they have the opportunity to not only see photographs of the arboretum, but also obtain descriptive information and growing information on the plants themselves. Through the help of Dr. Ed Leuck, and Dr. Bryan Alexander, I have created an interactive site that allows beginning gardeners as well as experienced botanists and other schools to learn about the plants of Louisiana and Centenary College.

Real-time Absorption Spectroscopy

MEGHAN ANDREWS*, Jesse Cope, and Juan Rodriguez
Department of Physics, Natural Sciences Division

Absorption Spectroscopy is widely used to identify the substances present in liquids and to quantify their concentration. We have developed an apparatus capable of performing absorption spectroscopy in real-time with a sensitivity of 0.001 absorption units. This system was used to monitor in real-time the diffusion of a dye/ethanol mixture into a cell containing pure ethanol. The results suggest that the dilution of the dye leads to disturbances that cannot be modeled as simple diffusion of the dye molecules in ethanol.

Synthetic Vascular Access Grafts

JULIE REISIG*, Rebecca Chilvers, Laura Coe, Patsy Carter, Gazi Zibari, Celeste Holland, Ya Nan Zhu, Ann Long, Brian Capell, Steve Alexander.
LSU Medical Center, Molecular and Cellular Physiology, Shreveport, LA 71130-3932, Sheehee Biomedical Research Institute.
Researched while participating in the Centenary-LSU Summer Research Program.
Primary Advisor: Dr. Steve Alexander
Centenary Advisor: Dr. Juan Rodriguez

My presentation is concerning the work, I did last summer. The purpose was to create a synthetic vascular access graft to be used during hemodialysis on patient's suffering from renal disease. There

are several grafts currently in use, but all have problems. My project was to make a better graft.

What's in an Orange? Only a Non-Ionizing Radiation PET Scan can tell

By **COLIN DELANEY**, Blane Sessions, and Juan Rodriguez
Department of Physics, Natural Sciences Division

Medical imaging uses a variety of techniques to create images of various biological samples. Among these techniques are Positron Emission Tomography (PET) scans. This technique uses ionizing radiation to create an image of a sample, by scanning a radioactive beam at different positions and angles. The aim of this project is to develop an imaging scanner for educational purposes that mimics the operation of PET, but without the use of harmful radiation. In this project, a laser pointer was used as the radiation source, along with a photomultiplier tube as the detector, and a computer, with Quick Basic and Excel, to record and analyze the data. Ultimately, the project seeks to create a user-friendly device that can scan a biological sample and produce an image of a certain slice of that sample, quickly, easily, and non-invasively.

Can brain swelling be monitored with light?

JASMIN "JAZZ" ALIBALIC * , and Juan Rodriguez
Department of Physics, Natural Sciences Division

Brain swelling is a frequent effect of concussions, strokes, intracranial infections, and other clinical conditions. As the brain swells its outer surface moves outward, pressing on the inner surface of the skull, and eventually increasing the pressure inside the brain to life-threatening levels. While it is possible to control the swelling of brain tissues, this requires careful monitoring of the brain. This is currently achieved with pressure probes that are bored into the patient's head. This is an invasive method that can lead to infection. Clearly, there is a need for a new noninvasive method. Recently it has been proposed that light transmission through the head can fulfill this need. Theoretically, it seems that the area between the brain and the skull, which is filled with clear fluid before swelling takes place, may have an impact on the transmission of red light signal through the head. The aim of this study is to test whether the gap between the brain and the skull disappears with the swelling.